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10/625,161	07/23/2003	Jeong-Hwan Song	5000-1-414	8002

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EXAMINER

LEPISTO, RYAN A

ART UNIT PAPER NUMBER

2883

DATE MAILED: 11/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/625,161

Applicant(s)

SONG ET AL.

Examiner

Ryan Lepisto

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 September 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 and 17-20 is/are rejected.
- 7) ☒ Claim(s) 16 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Objections*

1. Claim 16 is objected to because of the following informalities: The word "by" should be replaced with – of a material with – to clarify the claim. Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. **Claims 1-3, 7-10 and 20** are rejected under 35 U.S.C. 102(e) as being anticipated by **Lin (US 6,614,951 B2)**. Lin teaches an athermal arrayed-waveguide grating and the implied method of manufacturing of the grating (Figs. 1A, 2A, 3A, 3E and 3F) formed on a substrate (42) (with all the following components extending across the substrate) comprising an input waveguide (12) for inputting optical signals, a grating array (20) for separating the input signals into different light wavelengths, a first slab (14) having a first layer (part of 14 and labeled 32 in various drawings) that couples light

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from the input to a second layer (26) with different refractive indices from the first layer (column 6 lines 64-67) for serially coupling a signal from the first layer to the grating array (20) (light goes from the input to the first layer to the second layer to the grating in series), a second slab (18) for causing the different light wavelengths separated at the grating array (20) to be imaged on an egress surface and an output-waveguide array (16) for outputting each light wavelength imaged on the egress surface of the second slab (18) in a form of a separated channel. Lin further teaches that the first layer (part of 14, not labeled in Fig. 3E but is located just left of reference numeral 26 and is made of the same material as the layer formed to the right of 26 which is labeled 32) of the first slab (14) has a refractive index that is different from the input waveguide (12) (column 7 line 65 through column 8 line 2) while the second layer (26) of the first slab (14) can be the same material, and therefore the same refractive index of the input waveguide (12) (column 8 lines 19-23).

3. **Claims 14 and 15** are rejected under 35 U.S.C. 102(b) as being anticipated by He et al (US 6,169,838 B1). He teaches an arrayed waveguide grating and the inherent method of forming such a structure (Fig. 5) comprising the following components on a substrate (not shown); an input waveguide (not labeled), a first slab waveguide (72 with 75) having a first layer (72) and second layer (75) having different refractive indices ( $n$  and  $n'$  respectively, column 6 lines 13-16) and different temperature coefficients of refractive index (column 7 lines 48-49), which means the refractive indices differ with temperature variations also wherein both have ends with the first layer being disposed

to join the input waveguide while the second layer is disposed to join an end of the first layer and a grating array (70), a second slab (76 with 73) formed at the end of the grating (70) and output waveguides (not labeled) formed at the end of the second slab.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claims 6 and 13** are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin as applied to claims 1-3, 7-10 and 20 above, and further in view of what would have been obvious to one of ordinary skill in the art at the time of the invention.

Lin teaches the athermal arrayed-waveguide with the limitations described above used to reject claims 1-3, 7-10 and 14-16.

Lin does not teach expressly the first layer of the first slab having a length of 21.07  $\mu\text{m}$  in a direction in which the optical signal travels.

At the time the invention was made, it would be obvious to a person of ordinary skill in the art to have a length for the first layer of about 21.07  $\mu\text{m}$  in that this is a dimension that is typical in known waveguide gratings. Applicant has not disclosed that an exact length of 21.07  $\mu\text{m}$  provides an advantage, is used for a particular purpose, or solves a stated problem over say, 21.03  $\mu\text{m}$  or any dimension well known in the art. One of ordinary skill in the art, furthermore, would have expected Applicant's invention to

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perform equally well with waveguide grating with the differing refractive index layers as taught by Lin because it will efficiently and cheaply create an arrayed waveguide grating with a periodic intensity distribution (column 2 lines 15-19).

Therefore, it would have been obvious to one of ordinary skill in this art to modify Lin to obtain the invention as specified in claims 6, 13 and 19.

The motivation would have been to create an efficient waveguide grating array that is not associated with optical losses that result from a shift in wavelengths (column 1 lines 38-40).

5. **Claims 4 and 11** are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin as applied to claims 1-3, 7-10 and 20 above, and further in view **Terada et al (US 4,812,012)** (Terada).

Lin teaches the waveguide grating array with the limitations described above used to reject claims 1-3, 7-10 and 14-16.

Lin does not teach expressly a layer of material in the first slab waveguide having a refractive index of 1.415.

Terada teaches materials used in forming optical waveguides, where one is a polymer, polyfluoromethacrylate having a refractive index of 1.415 (column 6 lines 63-64).

Lin and Terada are analogous art because they are from the same field of endeavor, optical systems using polymer optical waveguide materials.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use the polymer as taught by Terada for the first layer as taught by Lin since Lin teaches only that a polymer would be suitable for the light transmission media in the waveguide grating array (Lin, column 7 lines 36-38).

The motivation for doing so would have been to increase efficiency in the waveguide grating array by using material know to produce waveguides capable of performing at high speeds and accuracy (Terada, column 7 line 20 through column 8 line 4).

6. **Claims 5 and 12** are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin as applied to claims 1-3, 7-10 and 20 above, and further in view of **Yoneda (US 2003/0021567 A1)** (Yoneda).

Lin teaches the waveguide grating array with the limitations described above used to reject claims 1-3, 7-10 and 14-16.

Lin does not teach expressly a layer of material in the first slab waveguide having a refractive index of 1.46.

Yoneda teaches an AWG (Fig. 10) with a substrate (203) with waveguides formed of the substrate where the layer is a glass Si substrate with refractive index of 1.46 (paragraph 0086).

Lin and Yoneda are analogous art because they are from the same field of endeavor, waveguide grating arrays with glass a glass Si layer with waveguides.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use the Si glass as taught by Yoneda for the second layer as taught by Lin since Lin teaches that the second layer may be Silicon or Silica (column 7 lines 3-5) and since both are well known glasses widely used in the art at the time of the invention.

The motivation for doing so would have been to increase efficiency in the AWG by using materials that will suppress the fluctuations of characteristics of optical waveguides elements due to temperature changes (Yoneda, abstract).

7. **Claim 19** is rejected under 35 U.S.C. 103(a) as being unpatentable over He as applied to claims 14 and 15 above, and further in view of what would have been obvious to one of ordinary skill in the art at the time of the invention.

He teaches the athermal arrayed-waveguide with the limitations described above.

He does not teach expressly the first layer of the first slab having a length of 21.07  $\mu\text{m}$  in a direction in which the optical signal travels.

At the time the invention was made, it would obvious to a person of ordinary skill in the art to have a length for the first layer of about 21.07  $\mu\text{m}$  in that this is a dimension that is typical in known waveguide gratings. Applicant has not disclosed that an exact length of 21.07  $\mu\text{m}$  provides an advantage, is used for a particular purpose, or solves a stated problem over say, 21.03  $\mu\text{m}$  or any dimension well know in the art. One of ordinary skill in the art, furthermore, would have expected Applicant's invention to

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perform equally well with waveguide grating with the differing refractive index layers as taught by He because it will efficiently create an arrayed waveguide grating with a method of convenient temperature compensation (column 7 lines 50-53).

Therefore, it would have been obvious to one of ordinary skill in this art to modify He to obtain the invention as specified in claim 19.

The motivation would have been to create an efficient waveguide grating array that eliminates the temperature sensitivity of the device without increasing loss and crosstalk (column 7 lines 61-65).

8. **Claim 17** is rejected under 35 U.S.C. 103(a) as being unpatentable over He as applied to claims 14 and 15 above, and further in view Terada.

He teaches the waveguide-grating array with the limitations described above.

He does not teach expressly a layer of material in the first slab waveguide having a refractive index of 1.415.

Terada teaches materials used in forming optical waveguides, where one is a polymer, polyfluoromethacrylate having a refractive index of 1.415 (column 6 lines 63-64).

He and Terada are analogous art because they are from the same field of endeavor, optical systems using polymer optical waveguide materials.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use the polymer as taught by Terada for the first layer as taught by He

since He teaches only that the invention can be applied to other material systems known in the art including plastic waveguides (column 7 lines 12-13).

The motivation for doing so would have been to increase efficiency in the waveguide grating array by using material know to produce waveguides capable of performing at high speeds and accuracy (Terada, column 7 line 20 through column 8 line 4).

9. **Claim 18** is rejected under 35 U.S.C. 103(a) as being unpatentable over He as applied to claims 14 and 15 above, and further in view of Yoneda.

He teaches the waveguide-grating array with the limitations described above.

He does not teach expressly a layer of material in the first slab waveguide having a refractive index of 1.46.

Yoneda teaches an AWG (Fig. 10) with a substrate (203) with waveguides formed of the substrate where the layer is a glass Si substrate with refractive index of 1.46 (paragraph 0086).

He and Yoneda are analogous art because they are from the same field of endeavor, waveguide grating arrays with glass layers with waveguides.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use the Si glass as taught by Yoneda for the second layer as taught by He since He teaches that the second layer may be Silica based (column 6 lines 53-55) and since both are well known glasses widely used in the art at the time of the invention.

The motivation for doing so would have been to increase efficiency in the AWG by using materials that will suppress the fluctuations of characteristics of optical waveguides elements due to temperature changes (Yoneda, abstract).

### ***Allowable Subject Matter***

10. **Claim 16** is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: This claim would be allowable over the prior art of record if rewritten in independent form including all of the limitations of the base claim and any intervening claims because the latter, either alone or in combination, does not disclose nor render obvious an AWG comprising a first slab having a first and second layers wherein the first layer has one end joined to an input waveguide an another joined to the second layer with the second layer having a second end joined to the arrayed grating and wherein the refractive indices of the two layers are different and the refractive index of the second layer is the same as the refractive index of the input waveguide, in combination with the rest of the claimed limitations.

### ***Response to Arguments***

11. Applicant's arguments filed 28 September 2005 have been fully considered but they are not persuasive. The amended claims 1 and 7 do not overcome the Lin

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rejection. The first layer of Lin couples a signal from the input waveguide, the signal from the first layer couples to the second layer and the signal from the second layer couples to the grating in series. Even though there is a section of material after the second layer this does not exclude it from reading on these claims. Claim 14 was amended to overcome the Lin rejection because it states the first layer physically touches the input waveguide and the second layer touches the grating, but is moot in view of the new rejection. Finally, the rejection of claim 3 is further explained in the Lin rejection above. The second layer is not labeled in Fig. 3E but is made of the same material as the material after the obstruction (26) and is labeled 32. This was labeled as part of 14 in the last action because there is no reference numeral pointed to the section and it is a part of the structure labeled 14.

### ***Conclusion***

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

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extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

**Contact Information**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan Lepisto whose telephone number is (571) 272-1946. The examiner can normally be reached on M-F 7:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

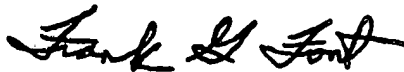
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Ryan Lepisto

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Date: 11/2/05



Frank Font

Supervisory Patent Examiner

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